FIFTH

ANNUAL REPORT

OF

SAPPORO

AGRICULTURAL COLLEGE,

JAPAN.

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Sapporo, Dec, 31st. 1881.

His Excellency,

DZUSHIO HIROTAKE,

Kaitaku Daishiokikwan,

Director Sapporo Ag'l. College.

Sir:—I have the honor to transmit to the Colonial Department through your Excellency, the Fifth Annual Report of the Sapporo Agricultural College.

Very respectfully,

Your Obedient Servant,

WM. P. BROOKS,

Acting President.

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ANNUAL REPORT

His Excellency

KURODA KIYOTAKA,

Minister of the Colonial Department,

Empire of Japan.

Sir; — I have the honor to present for your consideration the Fifth Annual Report of the Sapporo Agricultural College with accompanying papers.

The fifth year in the existence of the college has been one of uninterrupted prosperity, and its present condition is such as to warrant the highest hopes of its future success and usefulness. Its equipment having been brought to a reasonable degree of completeness, fewer additions and improvements have been made than in any previous year, and there is consequently less in this direction to chronicle than in former reports.

CHANGES IN THE FACULTY.

The year has been signalized by several changes in the faculty and additions thereto made necessary either by the resignation of former incumbents or the growing needs of the institution.

The loss of D. P. Penhallow, Act. pres. and Professor of Botany and Chemistry which took place in August last is to be regretted, depriving the institution, as it does, of the only remaining original members of the foreign staff and of the services of an enthusiastic and gifted teacher.

Upon his departure I was appointed by your Excellency to the position of Act. Pres. and to take temporary charge of the botanical department in addition to my former duties. Mr. Miyasaki, former instructor in chemistry, was made senior professor of that department and Mr. Kudo was made assistant professor in the same department. Mr. Kudo was also appointed professor of geology.

Prof. Kudo has spent seven years in the United States, is a graduate of Rutgers College, New Jersey in the academic department, and has devoted several years to post graduate study of analytical chemistry.

A long felt need has been supplied by the appointment of the Rev. James Summers, late Prof. in King's College, London, as professor of the English language. Prof. Summers is a teacher of long experience both in China and Japan. He gives instruction in the preparatory department as well as in the college proper as also do Profs. Miyasaki and Kudo.

Mr. Ichigo, Instructor in Mathematics, having received an appointment to an official position in a government department his place was filled by the appointment of Mr. Oshima Masatake, a graduate of our college, to the same position.

I have also to notice the resignation of Mr. Ikawa Kiyoshi, Instructor in English in the Preparatory Department, long a faithful and successful teacher in the instruction, he having received appointment to a wider sphere of usefulness in the Educational Department of this province.

ADDITIONS AND INPROVEMENTS.

The Astronomical Observatory which has been so long in process of construction has been finally completed; and

now makes the determination of latitude, longitude, time, etc. possible.

This building will also supply a long felt need in astronomical instruction of the students.

The improvements made upon the college-farm will be noticed in the report there-on which appears later.

A large number of books has this year been added to the college library.

Other additions and improvements will be mentioned in the departmental reports transmitted here-with.

DEPARTMENTAL INSTRUCTION.

The reports herewith transmitted afford all necessary information as to methods of instruction in the several departments. The progress made, the scope of the instruction given and the proficiency of the students may, in a measure, be seen by examination of the accompanying Rank Lists and Abstracts of Examination Exercises.

DEPARTMENT OF AGRICULTURE.

During the past year instruction has been given to the class graduated in July last upon the following subjects;—Seedraising: Stock Farming, including a consideration of the leading breeds of cattle, sheep, horses and swine and the principles of breeding, feeding and general management with particular reference to the conditions of this country; Dairy Farming with a careful study of butter and cheese making; Poultry Farming; Emasculation and Slaughter of Domestic Animals, and Forestry.

The ground covered has been so extensive that the treatment of the several subjects has necessarily been somewhat brief. Yet it is hoped that a general knowledge of principles has been imparted which can but prove

useful to our graduates in their subsequent careers in this new country. Instruction in all these subjects, as heretofore upon others, has been entirely by lectures, though the students have been recommended to consult the best authors upon the various branches.

The abstracts of examination papers appended to this report will afford some additional idea of the scope of the instruction given.

Class-room instruction to the present seniors and juniors has followed the same general course as in preceeding years and has afforded results, in the main, highly satisfactory. There is, in my opinion, much less tendency to merely memorizing in the case of instruction by lectures than in the case of text-book instruction. Clearer ideas and a better comprehension and grasp of the subjects are thus obtained.

AGRICULTURAL EXPERIMENTS.

During the year each member of the present junior class has conducted an experiment in the manner described in previous reports. The area allotted to each has been in most cases one fifth of an acre, and the entire work of preparation of soil, seeding, cultivation and harvesting has been performed by the students. The experiments, as in previous years, have been designed partially with a view to affording results of practical value to the agriculturists of Hokkaido, but above all to give the students training in the methods of exact experimenting. It must not be inferred, however, that the claim is made that one experiments have been in all cases exact.

That they have not been so, I am well aware; but provided the elements of inaccuracy are carefully pointed out, I submit that the experiment may serve the desired educational purpose.

The great natural fertility of the soil is, of course, in all experiments looking to a determination of relative value of manurial substances a great obstacle to success. Further the ravages, of insects and crows, both in this vicinity being unusually great, often come in to impair the accuracy of results. The experiments of this year, however so far as they cover the same ground, substantially corroborate the conclusions of previous year. Those which it seems important to notice are as follows; —

1. Ridge culture of beets and rutabaga turnips is more profitable than level culture.

2. Cutting potatoes of medium size lengthwise into two pieces for seed though not in all cases producing the largest crop, yields results most satisfactory from a financial stand-point.

3 Salt in small quantity, (about five bushels to the acre) considerably increases the yield of mangold-wurzel beets.

4. The percentage of sugar in the beet does not seem to be decreased by application of moderate dressings of herring guano, while the yield is much increased.

5. Notwithstanding its high cost (nearly forty-five yen * per ton) herring guano is, in most cases, the most profitable artificial fertilizer which can be obtained here.

It gives me pleasure to bear testimony to the unfailing interest, energy and perseverance of the students in carrying out their experimental work. In spite of drought, insects, crows, unruly cows, and in a few cases thieves they have almost invariably carried their work through to a valuable result: and many of their written reports afford indubitable evidence of careful study and thought and much keenness of perception.

Field work with the other classes has been mostly con-

* *The gold yen in equialent to* $ 997 *u. s. gold.*

ducted under the charge of Sato Shosuke a graduate of our college; and has covered about the same ground as in previous years, affording satisfactory results.

FARM REPORT.

The work of the College Farm for the past year has been, in many respects, productive of more satisfactory results than the work of any previous year in its history. This is to be ascribed principally to increased facilities for successful farming and to the knowledge gained by experience of this particular soil and climate.

The size of the farm has been more than quadrupled by the addition of about eight hundred acres of wild land. Much of this land is exceedingly low and flat being far too wet for cultivation. Quite a large area however is suitable for pasturage of young cattle; and though in advance of an accurate topographical survey it is unsafe to advance positive statements it is believed that most of it is susceptible of comparatively easy drainage. The acquisition of this land seemed desirable not only because additional pasture was required; but because the outlet to any system of underdrainage for the greatest part of the farm must pass through this wild land. The drainage and gradual improvement of this tract in connection with the original farm, would therefore seem to be the wisest course.

The area under cultivation has during the past year been much increased; and, though the drought of last summer was the severest within my experience of Hokkaido, most crops yielded good returns the value being greater than in any previous year.

Farm sales have been also much augmented during the year while expenses have increased only a little over six hundred *yen*.

The area under cultivation in the several crops, the yeild and the value at market prices are shown below.

FARM CROPS, 1880.

	Area in Acres.	Yield in lbs.	Value Yen.
Onions	1 3/4	24503	612.575
Beets	4	47865	191.460
Carrots	3	4270	42.700
Squashes	2	48262	361.965
Sugar Pumpkins	—	117715	588.575
Turnips, Swedes	2	10370	31.110
„ , English	6	95050	285.150
Potatoes	11 1/2	84800	636.000
Cabbages		500	5.000
Parsnips	1	10879	108.790
		tons.	
English Hay	41	77.6	1242.016
Oat Fodder	13	25.8	361.634
Corn Stalks		37.	259.000
Oat Straw		20.	200.000
Wheat „		3.3	29.700
Wild Hay		34.	306.000
Rye Straw		1/2	4.500
Barley „		1/4	2.000
Hay „		2.	20.000
		bushels	
Corn	30	1240	1437.500
Oats	16 1/2	767.8	851.400
Wheat	3	104.7	200.450
Rye		10.9	15.400
Barley		6.	6.600
Peas, Green 7857.053	1 2/5	95.1	57.528
Grass and vegetable seeds	8	—	1921.900
Sugar Cane Products	1 4/5	—	61.950
Total			9340.903

FINANCIAL STATEMENT.

Farm Expenditures

	Yen
Labor	6631.813
5 Horses and Transportation of same	646.949
Sundries	503.874
Transportation of Seeds, Tools, Guano etc, ;	485.577
Surg. Instruments, Barometer, Books and Thermometers	473.980
Building Expenses	454.946
Bricks for Building Kiln	329.460
Repairs (Harnesses, Machines, Wagons, Tools, etc ;	274.688
Roads and Bridges (Repairs and Construction)	251.637
Student's Experimental Crops	218.894
Fertilizers	148.621
Seed and Experimental Crops	107.163
Safe and Locks	65.900
Clay	64.000
Harness	31.000
Painting	29.741
Horse Shoes	14.066
Tools and Utensils	29.010
Cattle Food (Bran)	18.000
Total ....Yen	10778.219

Farm Credits.

Crops as per above statement ....Yen	9840.903
Sales of produce not included in or due to above. *	502.080

* *Not exact on account of frequent small sales from the field not separately recorded; but too small, rather than too large.*

½ Increase in value of stock (due to grass in pasture)	1139.500
Tiles manufactured	1499.820
Total	12982.303

From the above statement it will be seen that the past year, for the first time, the credit side exceeds the debit side of the account; and this notwithstanding the fact that among the items of the latter are included many such as for permanent inprovements, building, purchase of horses etc. which in a complete financial statement would appear also upon the credit side of the account.

The total amount of farm sales for the year is *Yen* 3125. 582. The largest items are the following;—milk, about *Yen* 854.; cattle, *Yen* 720.; beef, *Yen* 202.; onions, *Yen* 261.; wheat, *Yen*, 136. and hay, *Yen* 106. I may add that, were cheaper transportation possible, the sales might be very greatly increased.

STOCKS AND TEAMS.

Both stock and teams have been throughout the year uniformly in good health and in thriving condition and at the beginning of the year 1881 we were in possession of the following animals;—Neat Cattle: Ayrshire—males 3, females 13: Short-horn—males 2, females 3: Short-horn High Grade—steers 4, females 9: Half Short-horn—steers 4, females 4: Japanese—working bulls 6, oxen 4, femals 3.

Nambu horses—stallions 8, mares 5; swine 36.

The estimated value is as shown below;

Neat Cattle:

Ayrshires	*Yen* 3150.
Short-horns	1150.
Short-horn Grades	1450.
Half Bloods	272.

Japanese	820.
Horses	1300.
Swines	560.
Total....Yen	8702.

MANUFACTURE OF DRAINING TILES.

A large number of tiles has been manufactured during the past year at an expense very nearly the same as that of the preceding year. The economies effected in methods of labor are almost exactly counterbalanced by increase in prices of labor and materials. Yet it must be remembered that the cost of manufacture remains only nominally the same—a further depreciation of about twenty percent in value in the paper currency in which our accounts are kept makes the actual cost correspondingly less.

Below follows a statement of the numbers and kinds made and the cost of each.

2	inch round tiles	70631	at	1 *sen* *	each.
3	,, ,, ,,	11195	,,	2	,, .
4	,, ,, ,,	2155	,,	4	,, .
3	,, collars	52553	,,	6 ½ *rin* †	,, .
4	,, ,,	10463	,,	1 *sen* 2 *rin*	,, .
4	,, branch-tiles	150	,,	3 ,,	,, .

Some improvements having been recently made in our pugging mill it is confidently expected that, should the price of labor ramain unchanged, the cost of manufacture may next-season be considerably reduced. Preparations are now also measurably completed for beginning the underdraining of some portions of the farm and the work will be commenced during the present year.

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* *The* SEN *is the one hundredth part of a* YEN.

† *The* RIN *is the one tenth part of a* SEN.

EARLY AMBER CANE.

One and four fifths acres of land were this year planted with seed of the Early Amber cane. The growth was vigorous, and the cane was mostly well ripened before the coming of frost. Everything being in readiness the juice was expressed from the fresh cane, and at once boiled to the desired degree of concentration.

The process of manufacture was in all essential respects similar to that described in a previous report. In quality the syrup made was much superior to that of last year, and though the degree of concentration was not great we obtained a considerable quantity of dry crystallized sugar of light color and good quality.

The sugar sells readily here at ten sen and the syrup at five sen per pound.

The yield per acre is, however, small, and it is doubtful whether this cane can be cultivated and manufactured into sugar here at a profit. The total receipts for the past year have been only about thirty-five yen per acre while the expenses of manufacture alone reach nearly that amount. It is believed that the cane, however, may be planted considerably closer than heretofore without serious loss of quality; and that with the economies in manufacture which experience will enable us to effect it may yet be possible to obtain a small profit.

Experiments with different fertilizers with a view to a determination of their effect upon quality of the cane have this year been carried out. The table below shows the results.

PROXIMATE ANALYSIS, AMBER CANE.

Lot	1	2	3	4	5
Manures	Barn-yard and Wood-ashes	Sulphate of Potash	Superphosphate and Sulphate of Potash	Superphosphate	Wood-ashes
Moisture	percent 81.349	percent 79.128	percent 71.988	percent 80.471	percent 76.417
Solid Matter	18.651	20.872	28.012	19.529	23.583
Specific gravity	1.071	1.057	1.060	1.051	1.050
Grape Sugar	2.941	3.264	2.324	3.333	2.631
Cane Sugar	10.310	7.079	10.459	6.334	7.681

In further explanation of the above results it should be stated that the land which received an application of barn-yard manure and wood ashes was naturally richer than the other lots, and the growth of cane was most vigorous there. Hence, though the proportion of dry matter is slightly less in the cane of that lot the sugar is more abundant than in most of the others.

In the last four lots the proportion of crude fibre was undoubtedly greater because the canes were comparatively less succulent and small. Should further experiments confirm these results, it will undoubtedly be best to rely upon barn-yard manure and ashes as fertilizers for this crop as the others can only be obtained at considerable expense, and moreover they do not seem to be at all superior to the former. The manure used was well-rotted but not very strong, and was lightly ploughed in in the fall at the rate of about ten cords per acre. The ashes were applied broadcast in spring after a second ploughing and harrowed in. All the other fertilizers were applied broadcast upon the newly ploughed surface and harrowed

in just previous to the planting of the seed. The wood ashes were applied to lot 1. at the rate of 20 bushels per acre. Lot 2. received sulphate of potash at the rate 50 pounds per acre, lot 3. superphosphate 50 pounds and sulphate of potash 50 pounds per acre, lot 4. superphosphate 50 pounds per acre, lot 5 wood ashes 40 bushels per acre.

For the analytical results given above I am indebted to Sato Shosuke a groduate of our college.

It is my firm belief that by careful yearly selection of the best and earliest ripened seed we can effect much improvement in the quality of the cane, and so hasten the time of ripening that there shall never be danger of frost before the cane is mature. Therefore although the financial results of our experiments are not yet satisfactory, I deem it advisable to continue them upon a small scale for a few more years.

BUILDINGS ERECTED AND PERMANENT IMPROVEMENTS MADE.

During the year a small black-smith's shop has been erected at an expense of yen 37.84; and most of the repairs of wagons, machines and implements are now made on the farm at greatly diminished expense.

A house in Japanese style for farm work men has also been made by remodeling an old shed: and in one end of the same building is a large room for carpenter's work, it being found that such repairs of buildings, wagons, tools, yokes, sleds, etc. as are constantly needed can be most economically made by a man always on the farm.

One new kiln having a capacity of about four thousand 2-inch tiles has been constructed, and over both this and the old one roofs for protection against rain and snow

have been erected.

An open ditch about four thousand feet in length, three feet in width on the bottom, with sides at a slope of one to one and of an average depth of nearly three feet has been dug to afford an outlet for water from underdrains which it is proposed to put in at an early day. Besides this numerous smaller ditches have been opened.

New fences made necessary by the increasing number of neat cattle have been erected through a portion of our new land.

The total length is 3180 feet. In addition to this 1272 feet of post and board fence has been built to replace cheaper fences which had become rotten.

About three hundred feet of corduroy road has been made across a swampy part of the farm and more than one half a mile of old road has been raised and otherwise much improved.

Twenty-five acres of wild land have been broken up this year and planted with potatoes, corn and turnips.

INJURIOUS INSECTS.

Further observations have been made upon the habits of two of the most injurious insects common in this vicinity. It is found that the cut-worm behaves substantially as stated to be probable in the "Fourth Annual Report;" and no means of preventing its ravages has been devised which can be adopted on a large scale other than the one there recommended, viz: hand picking. A strip of stiff paper or tin about three inches wide and long enough to form a cylinder just large enough to enclose the plant set into the ground to the depth of about one inch leaving the plant undisturbed in the centre of the cylinder is full protection against these worms for they always crawl over the surface. In gardens such a method of protection is

practicable; but of course not in a large field. The beet is the crop suffering most, and for this crop some soil should be selected which has been kept altogether free from cut worms during the preceding year. A late summer and autumn fallow kept altogether free from weeds is one of the best means of preparation.

The method of capturing the moths by kindling fires at night at the seasons when they are flying is only partially successful. The *Agrotis* do not enter the fire as freely as many other species; but when it is remembered that one moth possesses the potentiality of perhaps fifty worms it will be seen that even though the number secured may seem small it is equivalent to killing many worms.

The best season for kindling fires is during July and early August.

The barley insect alluded to in my last report is found to reach the imago state in June, when the little flies may be seen in great numbers on the leaves of the barley plants then usually just about beginning to shoot up rapid ly. The eggs are, doubtless, inserted beneath the epidermis in the pulpy tissue of the leaf upon which the maggot feeds. The injury to the crop, if the number of maggots is not extraordinarily great, is not particularly noticeable upon rich soil; but upon poor soil even a few take as large a proportion of the at best scanty stores of nutriment elaborated in the leaf that the plant is so much weakened as to produce only a small amount of grain of very inferior quality. The number of maggots is, however, often very great, as many as three or four being found in single leaf., In such cases the green pulp is eaten entirely across from edge to edge of the leaf and all the terminal part beyond dies. The leaf surface of the plant is thus so much lessened that the development of the grain is very imperfect and the result is a small and light crop of inferior malting quality. It would not seem

to be practicable to repel the flies, and it certainly is not possible to destroy the maggots. The only remedies must, therefore, apparently be those aiming at the destruction of the pupae. I have found that by pulling the stubble when the soil is moist and adhesive a large number of pupae are brought up with the earth adhering to the roots— sometimes as many as eight or ten with a single handful; and it is certain that but few can then be left in the soil. It would, therefore, seem to be perfectly practicable to destroy most of these insects by pulling and burning the stubble any time between the harvesting of the barley and winter; but preferably before the fibrous roots are much decayed for then a greater quantity of earth will be brought up with the stubble and consequently a greater number of pupae.

In the Japanese system of intensive culture in drills about one foot apart in fields where a weed is not allowed to grow: and in this country of cheap labor such a system of destruction may, perhaps, be profitable, though under conditions found in most other countries I am well aware it could not be so. Ploughing a shallow furrow along the line of the drills in such a manner as to bring the roots of the stubble, as far as possible, to the surface late in autumn will perhaps so expose many of the pupae to the cold that they will be killed: but in advance of experiments to determine how much exposure to cold the pupae will bear it is unsafe to make positive assertions. Such experiments will be carried out at an early day.

The locusts this year, for the first time in the recent history of Hokkaido, proved highly destructive to crops in some parts of the island. These locusts are very similar in appearance and habits to the "Rocky Mountain locust" *(Caloptenus Spretus)*, often such a couse of loss in the United States. Fortunately the habits and means of

extraordinary drought and in the few seasons immediately following such that great loss is to be feared.

In ordinary seasons the insects will confine themselves to their natural habit at feeding upon wild plants.

There are many other injurious insects about the habits of which little is at present known, and from time to time as opportunity offers endeavor will be made to learn about them. Every effort is also made to induce students to engage in such work and several of them have already made valuable discoveries.

AGRICULTURAL EXHIBITION.

The exhibition of this year was upon a much larger scale than the first, and was in every respect a decided success. The number of private exhibitors was larger, and the amount of money distributed in prizes greater than ever before. The yearly increasing interest in such exhibitions is one of the most hopeful signs in the agricultural outlook for the future.

ANNIVERSARY EXERCISES.

The past year must ever be a memorable one in the annals of the college for it has been marked by the graduation of its first class. The exercises occured on July 10th, and were largely attended by officials and friends of the students.

The exercises commenced with an exhibition of the proficiency of all the students of the college in drill under command of Lieut. Kato, and it is sufficient to say that their manly, soldierly bearing and evident earnestness and interest afforded most convincing proof of the thoroughness of the training they had received.

The graduation exercises proper took place in Military hall which together with the grounds, gates etc. was tastefully decorated with evergreens, flowers, bunting, flags and ornamental lanterns. Six theses— three in Japanese and three in English— were pronounced by members of the graduating class and the valedictory addresses were delivered by Arakawa Shigehide of Tokio. The diplomas conferring the degree *Nōgakushi* were then handed to the successful candidates— thirteen in number— by H. E. the Governor, Dzusho Hirotake.

Then followed speeches by the Vice-governor, Mr. Suzuki, H. E. the governor, Mr. Dzusho and Prof. Penhallow, these concluding the exercises of the day.

In the evening a dinner was given to members of the graduating class to which officers and teachers of the college were invited, and the occasion was an exceedingly enjoyable one. The buildings and grounds were beautifully illuminated with lanterns and fire-works were sent up in great quantity. Thus passed a most enjoyable and ever-to-be-remembered day—the first, it is hoped, in a long and never ending series.

PREPARATORY DEPARTMENT.

No essential changes out of the ordinary course of events are to be chronicled in this department of the College. The members of the Frst Class at the close of the Summer term presented themselves for examination for admission to the Academic course of study; and four were admitted, most of the others electing to remain in the First Class another year. Now that the services of an English teacher are available for this department it is believed that the classes will make much more satisfactory progress.

In submitting this report for your Excellency's con-

sideration, allow me in behalf of the College to express my gratitude at the liberality and wise fore-thought of the government in so generously providing for its needs and so earnestly seconding all efforts made for its improvements. We have now sent forth our first class,—each man we believe well equipped for the work he may be called upon to do,—how well time alone can show. But while we feel that much has been accomplished we are only too well aware that much still remains to be done. Commending the College, then, to the continued consideration of the Colonial Department.

I. remain

Very respectfully,

Your Excellency's

obedient servant,

Wm. P. Brooks,

Acting President.

Sapporo, 1881.

REPORT

ON THE

DEPARTMENT OF PHYSIOLOGY

AND

VETERINARY MEDICINE.

PROF. J. C. CUTTER, B. S., M. D.

Prof. Wm. P. Brooks

Acting President of

Sapporo Agricultural College,

Sir;

The instruction in the department under my care during the year 1880, owing to the departure of two gentlemen for America, has been varied. It has embraced English, History of English Literature, Modern History, Elements of Political Economy, Zoölogy, Microscopy and the rudiments of veterinary Medicine. In addition to which have been performed the duties of medical attendant to the students and faculty, as well as consulting and visiting duties at the hospital and in the town.

The course in Zoology has yielded more satisfactory results than in former years. Owing to the non-arrival of mounted preparations, slides, coverglasses etc., the field embraced and the work performed in Microscopy was limited. Each day's work was prefaced by a short lecture upon the subject at hand, extended and minute directions given, the order of and the various manipulation explained and there each students was required to verify the statements by practical work upon the material provided. For evident reasons no instruction could be given upon injecting, mounting and preserving sections.

The instruction in Veterinary Medecine has been by lectures, demonstrations, and text-books used interchangeably as the topics under consideration demanded. Desiring to employ the limited time to the best practical advantage, the early part of the term was devoted to animal hygiene—a consideration of the effects of fluctuations in the quantity, quality and kinds of water, air and food; of the influences of soil, climate, and weather; of the effects of injudicious exercise, of improper habitations and of the

ignorant drugging of ailing horses. In other words the ideas advanced were intended to show the advantage of preserving of the average of health, to indicate the accepted measures and to demonstrate the greater economy of health preservation over subsequent treatment of disease processes. As the class had received in former years limited instructions in anatomy and physiology, human and comparative, the salient points were now only hastily reviewed. It was deemed advisable before considering the circumstances under which diseases became developed, of the conditions of their existence, of their nature and their causes, to ascertain the received facts about the principal agents, applications and medecines used for the alleviation or cure of diseases or injuries among domesticated animals. A limited portion of the time was devoted to materia medica, but the major portion was employed in the consideration of the actions of the agents on the animal economy and their therapeutic and clinical applications. This wasf ollowed by instructions upon the symptoms, course, duration, effects and treatment of fever and inflammation *per se.* The few remaining weeks of the term were devoted to recitations and discussions upon the more common maladies of the ox and horse.

With all the advantages afforded, a student in the regular course of this college cannot become a thoroughly trained self-reliant veterinary practitioner, and simply for the want of time, in the midst of his other equally important duties, to become versed in the principles of Comparative Histology, Anatomy, Physiology, Pathology, Therapeutics and Hygiene. These departments of science are all preliminary subjects of study and constitute a necessary and appropriate introduction to the practice of Veterinary Medicine. Each of these branches requires continued, prolonged study for their proper acquisition. A well-balanced knowledge of all these topics is an es-

sential prerequisite to the successful Veterinarian. At present a student of this college can only acquire a *smattering* of the elements. He cannot in 120 hours instruction gain an amount of knowledge which will enable him to understand disease processes, to distinguish morbid phenomena and to intelligently, self-reliently advise a course of treatment appropriate to maladies under varying conditions. If the course of study in this college be reviced, would it not be well to allow more time to the important subject of animal medecine?

During the year 1880 less prescription for medecines have been written, less medical visits made and less "excused absences" for medical reasons granted to students than during the preceding year. One student was allowed a year's vacation on account of mental prostration and nervous exhaustion. This untoward malady seems to have resulted, not from an excess of collegiate work, but from mental strain upon tapics outside of his line of college duty. The maladies of the year have been principally the result of individual neglect of inculcated rules of health. The major part of these have been of a digestive nature with consequent cerebral heaviness. Also, it is my candid opinion that 50% of the maladies (?) for which the students absented themselves from duty, and later calling for medical assistance, would not have called for absenteeism if said students had *willed* to be on duty.

Though no marked case of lung-disease has yet developed, yet several of the students present an array of symptoms pointing to the fact that the notorious absence of proper means for ventilation of the dormitory during the winter months, is having a deteriorating effect on their constitutions. When inclement weather renders necessary the closing of windows, when certain defects cause large quantities of smoke and products of partial combustion to constantly appear in the rooms, when the transoms are

closed or only partially opened, when these products of incomplete combustion are mingled with the emanations from the pulmonic and cutaneous surfaces, when a large proportion of these materials find their way into the hall to accumulate especially in the second story of the dormitory, when the halls are provided with no adequate outlets, then are the students exposed during the most helpless period of the twenty-four hours— the hours of sleep— to constant-acting, pernicious influences, which influences are the most powerful factors in developing diseases of the air-passages, like branchitis, catarrhal pneumonia, phthisis-pulmonalis, and diseases marked by general debility with the tendency to physical incapacity and premature death.

The effect are the animal system of Fœtid air containing organic matter, excess of water and carbonic acid, produced by respiration and cutaneous exhalation, is often very marked. Heaviness, head-ache inertness, and in some cases, nausea are produced. When air moderately vitiated by respiration and exhalations is breathed eight to twelve hours each day, by a student; when such student is pursuing a sedentary occupation, and is compelled to assume a constrained, stooping posture for several consecutive hours; when such student is at the growing period of life; when he is prevented by the inclemency of the weather from taking daily lung, muscle and brain animating exercises, then does such an atmosphere have a most injurious effect upon his health. He soon becomes pale, partially loses his appetite, and after a time declines in muscular strength and in mental energy. The aeration and nutrition of the blood is thus interfered with. Of the special diseases arising out of such conditions, lung affections are most common. The mortality numerically from lung maladies is higher than from that of any other disease prevailing in the cool, moist countries of northern

Europe. It is estimated that one-tenth of the population of the temperate zone die of phthisis pulmonalis. The *prevention* of this disease is only to be looked for in the unrestricted enjoyment of pure air.

To prevent this malady from gaining a foot-hold in the constitutions of the students of this college, immediate attention must be paid to securing a thorough ventilation of the dormitory. Proper arrangements should be made to secure a constant though imperceptible movement of air *out* of the student's sleeping and study room into the halls, thence by suitably situated and constructed conduits of ample capacity to the external air above the roof. By the simple means of heat expansion of the air and perflation of the wind can the vitiated air be rapidly removed from the present dormitory, when the colder and purer air will enter the rooms by many channels now existing. The health, well-being and future usefulness of the students of this college demands that they be provided with:

(1) Pure air at all hours and in all places.

(2) A diet varied, wholesome and sufficient for the wants but not the luxuries of the body.

(3) Exercise in the open air each day sufficient to balance the food energy not expended in growth and mental energy.

(4) Ample solar and superior artificial illumination.

Accompanying this report is a paper upon Myopia, the amount now existing in the college, its influence on the present and future of the student and suggestions for its amelioration.

I remain, Sir,
very respectfully,
JOHN C. CUTTLE M. D.,
Prof. Physiol. and Comp. Anat.

REPORT

ON THE

MATHEMATICAL DEPARTMENT.

PROF. C. H. PEABODY, B. S.

Prof. Wm. P. Brooks,

Sir;

The work of this department for the past year has followed the course hitherto pursued, with a few alterations suggested by experience.

The instruction in pure mathematics is given in the form of recitation. To counteract the tendency to lean unduly on the text-book, the students are encouraged to vary the form of the demonstrations or to present original proofs, and to criticise the work of their classmates.

The lectures and recitations in surveying and topography are accompanied by field-work, and drawing and plotting. For field-work the class is divided into parties; each member has his work assigned for the day, but each in turn fills the several positions of the party. As far as is consistent with instruction, the parties are thrown on their own resourses and are made responsible for work done. Each student is required to present in good form all the notes, calculations and drawings for the work of his party. The instruction in civil engineering, assigned to the senior class, was given for the first time this year. They were taught, in a simple and direct way the elements of the strength of materials, of the calculations for roof and bridge trusses and of the construction of foundations and roads. The aim in all cases, was to give the ready methods used by engineers for ordinary work.

Ganot's Physics is used as a text book, and is accompanied by illustrations and experiments in such a manner that the exercise takes the nature of a lecture or a recitation, as circumstances make advisable. The course in astronomy begins with matters of common observation and follows, in general, the path of discovery in the discussion of the solar and stellar systems. The observatory being now finished it is expected that our transit-theodolite will be used for the work to which it is adapted.

The time assigned to mechanical drawing is well employed in learning the use of instruments and the handling of water-colors, in learning to draw the projections and intersections of simple geometrical bodies, and in applying knowledge thus gained to making plots of surveys, to topographical drawing, and to the machine and architectural drawing appropriate to our course.

Bookeeping and business forms are taught to familiarize the students with the ordinary transactions of business, and the methods of recording them. A simple method of keeping farm accounts is developed which may be applied also, to any business of small extent.

Very respectfully

C. H. Peabody.

REPORT

ON THE

DEPARTMENT OF INSTRUCTION

IN

ENGLISH.

PROF. JAMES SUMMERS.

Mr. Acting-President Brooks.

Sir;

I entered upon my duties as Professor of English in this College in September last year, when you allotted to me the charge of the Freshman class. I found that class deficient in reading and composition of English, and therefore I selected what appeared to me a suitable book—*Lord's Modern History of Europe*—from the library and placed it in their hands for practise in reading.

After giving attention to the defects in their pronunciation I proceeded to criticise every passage as they read it—calling their attention to defects in style and to passages that were worthy of imitation. Two hours in the week were occupied in this way.

One lecture a week was devoted to the principles of English composition, in which, as there was no suitable text book, I communicated to them much of the matter contained in the admirable little work of Profr. Nichol of Glasgow with notes and comments of my own. The practise of taking notes is much to be encouraged, and I have found the students very apt in doing so.

In addition I delivered a course of lectures on Rhetoric to aid them in the writing of Essays and in literary composition generally. These lectures were founded on the *Elements of Rhetoric* by *G. Flon*—a work published under the authority of the Council of Public Instruction in France. A portion of this work I translated for the purpose and adapted to their wants. Some valuable illustrative passages they carefully studied. Writing from dictation and endeavouring to comprehend the new ideas brought to their notice in this way has had the most beneficial effect upon many of the students. The running commentary upon the subject of the lectures, and the continued practise of catechetical teaching has, I am fain

to believe, rendered the Freshman class able to make good progress.

Subjects on which they were fully acquainted or which I had clearly explained were given as themes for their compositions, of which they had to produce one exercise every fortnight.

One hour in the week was devoted to elocutionary exercise in the repetition of some good passage from an English classical author. By this means the class has been familiarized with standard style in English. Their pronunciation has thus improved, and they have, I trust, caught something of the rhythm a spirit of the language.

The common error is to advance the student by rapid steps to new matter before the old has been fully mastered. For this reason the committing to memory from time to time passages from good authors has an important and invigorating effect on the minds of students of language.

During the second term I have followed a similar course with the following exceptions: One exercise in Reading has been omitted; in Rhetoric Professor Bain's work has been made use of to some extent and this has been supplemented by various notes comments of my own.

At the request of the Faculty I have taken the same class in Freehand Drawing, and several of the students show marked ability for this art. One afternoon was occupied in this exercise.

I am happy to be able to state that the members of the Freshman class have been, with hardly an exception, devoted to their work and most attentive to my instruction.

During the same period I have voluntarily assisted in the Preparatory Department and spent eighteen hours a week in teaching the three classes of which it consists. I found the pupils very much in want of foreign instruc-

tion in English. In all the classes the attainments were very low and the first class only could be said to have any knowledge of English. My endeavour has been to induce a good pronunciation of English in the pupils and to give them a facility in oral composition. My knowledge of Japanese has been of the greatest assistance in this respect, and without it very little could have been effected in teaching the 2nd and 3rd classes, for whom in my opinion a Japanese teacher is the most suitable.

The first class in the department has very industriously followed my lectures on General History during the term just past, and they have been exercised in the practise of taking notes in this subject with very good results.

I am, Sir,

your obedt. Sert.

James Summers

Professor.

REPORT

ON THE

CHEMICAL DEPARTMENT.

PROF. M. MIYASAKI, RIGAKUSHI.

Acting President Wm. P. Brooks.

Sir;

I have the honor to present the following report: — During the past year, no great change has been made in my department. In fact, I have followed the course proposed by Prof. Penhallow; so it seems to me that it will not be necessary here to enter into much detail. At the beginning of the first term, Prof. Kudo greatly assisted me by giving instruction during my absence.

Instruction was given only to the freshman class. The first half term was devoted to the teaching of elementary chemistry, using Roscoe's Chemistry as a text book and Fowne's as a reference book, the object being to make the student well acquainted with the general principles of chemistry.

Instruction in practical work has been given since the beginning of the last half term. This I had good opportunity for teaching well as the chemicals and apparatus required had been fully provided. After the students had attained a pretty thorough knowledge with regard to the examination of substances, simple and compound, by the use of the blowpipe, analysis by the humid process was begun and a number of substances were laid before the students to be examined, in order to make them familiar with the reactions of the principal substances. But up to this time the analysis has been elementary, being intended only as an introduction to the examination of complex substances for the next term. Most of the students have made satisfactory progress, indeed more than could have been expected: and especially should it be noted that atteniton has been paid by several of the students they having displayed disposition diligently to pursue their studies in this department.

During this term, no special extra work has been done

which is worth mentioning, but a number of analysis of beet-root were made and the results are given below.

BEET-ROOTS.

The analysis shows that the sugar-beets which have been raised in several parts of Hokkaidó contained generally a high percentage of sugar and comparing the results of this year with those of previous years, it is found that even the poorest specimens exceed the richest of other years. So far as I can judge, these good results are perhaps due to the favorable season, although the experience in management and manuring have aided in an extraordinary manner the cultivation of sugar-beets. If such successful culture should continue year by year, the prosperity of sugar manufacturing industry will be remarkable in the near future.

The following are the results of analyses of sugar beets planted at the college farm, which were treated with different kinds of manures. The manures used were principally commercial salts, chemical fertilizers, such as potassium nitrate, magnesium sulphate, superphosphate of lime etc; and also fish guano or oil cake and ashes were used. Analyses of beets from Usu and Otaru were also made and in these, the results showed a high percentage of sugar. Here the important question arises as to what is the most suitable manure for beet culture; but it is quite impossible to give any decided opinion, until after the experience of some years. Nevertheless, judging from the manures used in different localities, it may be considered that fish guano or oil cake are advantageous for the purpose.

BEETS FROM THE COLLEGE-FARM.

Nos.	Fertilizers	Per Acre pounds	Sp. gr. at 15°C.	Moisture	Sugar
1.	Herring guano	890	1.04	89.87%	5.59%
	Ashes	1250			
2.	Herring guano	890			
	Ashes	1250	1.045	87.91 „	5.79 „
	Salt	150			
3.	Herring guano	890			
	Ashes	1250	1.045	87.63 „	5.28 „
	Salt	300			
4.	Herring guano	890			
	Ashes	1250	1.04	87.32 „	5.26 „
	Salt	450			
5.	Herring guano	890			
	Ashes	1250	1.04	90.142 „	5.33 „
	Salt	600			
6.	Herring guano	890			
	Ashes	1250	1.035	87.78 „	5.36 „
	Salt	750			
7.	Potassium nitrate	570			
	Sodium nitrate	495	1.066	79.09 „	7.66 „
	Magnesium sulphate	360			
	Superphosphate	150			
8.	Potassium chloride	495			
	Mag. sulphate	360	1.075	78.87 „	11.18 „
	Superphosphate	150			
9.	Potassium nitrate	570			
	Sodium nitrate	495	1.07	80.03 „	10.00 „
	Superphosphate	150			
10.	Herring guano	1200			
	Mag. sulphate	300	1.075	78.57 „	11.66 „
11.	Pot. nitrate	570			
	Sod. nitrate	495	1.075	83.14 „	10.807„
	Mag. sulphate	360			
		cords			
12.	No manure		1.07	76.58 „	10.97 „
13.	Barnyard manure	10	1.055	85.34 „	7.842„
		lbs			
14.	Ashes	2700	1.065	87.138 „	8.71 „
	Herring guano	600			

Nos.	Fertilizers	Per Acre pounds	Sp. gr. at 15°C.	Moisture	Sugar
15.	Ashes	5400	1.04	89.7%	5.78%
16.	Rape seed oil cake	120	1.06	80.8 „	8.11 „
17.	Potassium nitrate	300			
	Mag. sulphate	150	1.055	85.908 „	6.1 „
	Superphosphate	600			
18.	No manure	—	1.045	83.152 „	6.39 „

Among the sugar beets brought up from Usu I found the richest specimen contained as much as 13.13% of sugar and this is the highest percentage that I have ever had.

ANALYSIS OF COPPFR ORES.

The following was reported by Mr. Takagi a student of the senior class.

	percentage of copper
1. Ore from Jozankei	9.215
2. „ „ Moiwa (unwashed)	3.159
3. „ „ „ (washed)	9.81
4. Another sample „ „	18.621

The ore from Jozaukei was a specimen of so called peacock ore with slight mixture of clay and silica and it in general had the characteristics of a rich ore. The second specimen was the poorest of all, with a considerable mixture of iron pyrites, lime carbonate and silica, but washing carrying away a portion of these substances left a material containing an increased percentage of copper as is seen from the above. The fourth sample was the best and may admit of profitable extraction of the metal.

Very respectfully,

M. Miyasaki.

SAPPORO AGRICULTURAL COLLEGE.

1880—81.

CATALOGUE OF

OFFICERS AND STUDENTS.

OFFICERS OF ADMINISTRATION.

Dzusho Hirotake, ... Kagoshima.
Kaitaku Dai Shokikuan,
Director.

Mori Genzo, ... Niigata.
Warden.

Ikawa Kiyoshi, ... Shimane.
Assistant Warden.

Kato Masatoshi, ... Shidzuoka.
Assistant Warden.

Oshima Masatake, *Nogakushi*, ... Kanagawa.
Librarian, Foreign Department.

Nagao Fuzan, ... Shidzuoka.
Librarian, Chainese and Japanese department.

Yoshida Kiyonori. ... ... Kagoshima.
Farm Superintendent.

Sato Shosuke, *Nógakushi*, ... Iwate.
Farm Interpreter and Assistant Superintendent.

Kuroiwa Yomonoshin, *Nôgakushi*, ... Kochi.
Farm Engineer and Superintendent of Tile-making.

FACULTY.

William P. Brooks, B. S., ... America.
Acting President, Professor of Agriculture, and Director of College Farm.

J. Clarence Cutter, B. S., M. D., ... America.
Professor of Physiology and Comparative Anatomy, and Professor of English Literature.

Cecil H. Peabody, B. S., ... America.
Professor of Mathematics and Civil Engineering.

JAMES SUMMERS, ... England.
Professor of English.

MIYASAKI MICHIMASA, *Riyakushi*, ... Ishikawa.
Professor of Chemistry.

KATO SHIGETO, ... Ibaraki.
Second Lieut., Japanes Army. Professor of Military Science and Tactics.

KUDO SEI-ICHI, A. B. ... ...
Professor of Geology and Assistant professor of Chemistry.

NAGAO FUZAN, ... Shidzuoka.
Instructor in Chinese and Japanese.

OSHIMA MASATAKE, *Nogakushi*, ... Kanagawa.
Instructor in Mathematics.

ACADEMIC STUDENTS.

GRADUATES OF 1880.

Arakawa Shigehide, ...	Tokio.
Ideta Seitaro, ...	Oita.
Ito Kadzutaka, ...	Tokio.
Kuroiwa Yomonoshin, ...	Kochi.
Nakashima Shinshi, ...	Ishikawa.
Ono Kanemoto, ...	Shidzuoka.
Oshima Masatake, ...	Kanagawa.
Sato Isami, ...	Hokkaido.
Sato Shosuke, ...	Iwate.
Tanouchi Steroku, ...	Kochi.
Uchida Kiyoshi, ...	,,
Watase Torajiro, ...	Shidzuoka.
Yanagimoto Michiyoshi, ...	Miye.
Total, ... 13.	

SENIORS.

Adachi Mototaro, ...	Tokio.
Fujita Kusaburo, ...	,,
Hiroi Isami, ...	Kochi.
Ikeda Takajiro,*	Nagasaki.
Iwasaki Yukichika, ...	Osaka.
Machimura Kinya, ...	Ishikawa.
Miyabe Kingo, ...	Tokio.
Ota Inazo, ...	,,
Suwa Shikazo, ...	Yehime.
Takagi Tamataro, ...	Hiroshima.
Tsurusaki Kumeichi, ...	Nagasaki.

* *Name recently changed from Minami to Ikeda.*

Uchimura Kanzo, ...	Gunma.
Total. ... ... 12.	

JUNIORS.

Akakabe Jiro, ...	Ishikawa.
Dzusho Tsunenori, ...	Kagoshima.
Harada Shigesada, ...	Ibaraki.
Hisashima Shigeyoshi, ...	Tokio.
Hori Soichi, ...	Kagoshima.
Ibuki Sozo, ...	Kioto.
Kojima Kisaku, ...	Shidzuoka.
Muto Isaburo, ...	Shiga.
Nakane Toru, ...	Hokkaido.
Oidzumi Riotaro, ...	Yamagata.
Otsu Watari, ...	Miyagi.
Saito Shozaburo, ...	Niigata.
Sugiyama Kiyotoshi, ...	Chiba.
Takaoka Naokichi, ...	Shimane.
Togano Shiokichi, ...	Niigata.
Total. ... ... 15.	

FRESHMEN.

Fukuhara Tetsunosuke, ...	Yamaguchi.
Hayakawa Tetsuya, ...	Okayama.
Hondo Genjiro, ...	Nagasaki.
Kashiramoto Motosada, ...	Shimane.
Kawamura Chikasuye, ...	Tokio.
Kikuchi Kumataro, ...	Iwate.

Kitago Ayagoro, ...	Okayama.
Kuromiya Takeo, ...	Aichi.
Mimashi Kumekichi, ...	Yamaguchi.
Mori Tsurujiro, ...	,,
Nakagawa Taro, ...	,,
Nakane Hisashi, ...	Hokkaido.
Oka Bunji, ...	Miyagi.
Sase Tatsusaburo, ...	Awomori.
Shiga Shigetaka, ...	Aichi.
Takenobu Yoshitaro, ...	Shimane.
Teshima Juro, ...	Kioto.
Watase Shozaburo, ...	Shidzuoka.
Yamashita Keitaro, ...	Hiogo.
Yuki Shogo, ...	Fukushima.
Total. ... ... 20.	

PREPARATORY STUDENTS.

FIRST CLASS.

Kanno Susumi, ...	Hokkaido.
Kon Sotosaburo, ...	Awomori.
Koseki Yoshinobu, ...	Hokkaido.
Midzuno Kitaro, ...	Tokio.
Miyabara Seiichiro, ...	Kagoshima.
Nakamura Morikadzu, ...	Hokkaido.
Okubo Tsurujiro, ...	Chiba.
Ono Saburo, ...	Fukui.
Takekawa Shozo, ...	Tokio.
Tanouchi Yaokuma, ...	Kochi.
Tomotaka Inosuke, ...	Fukui.
Utsumi Kadzusada, ...	Tokio.
Yagishita Sentaro, ...	Ibaraki.

RANK LISTS.
SECOND TERM 1879-80.
SENIOR CLASS.

Name.	Rank.	General Average.	Veterinary Weight. 6	Political Economy Weight. 4	Agriculture Weight. 3	Engineering Weight. 6	Declamation Weight. 1	Military Weight. 2	Deportment.
Arakawa Shigehide.	1	88.2	95.3	93.3	88.7	865.	87.0	75	100
Sato Shosuke	2	85.2	84.6	97.0	80.7	79.0	91.0	86.5	100
Watase Torajiro.	3	83.8	85.3	95.2	78.9	76.0	80.4	89.0	100
Ono Kanemoto.	4	82.3	78.1	79.8	82.6	87.0	81.0	86.0	100
Oshima Masatake.	5	79.4	78.5	83.8	77.8	84.0	86.2	74.0	100
Uchida Kiyoshi.	6	79.1	81.5	82.5	83.6	73.5	79.0	75.0	100
Kuroiwa Yomonoshin.	7	78.1	76.0	55.0	83.0	90.5	70.0	90.0	100
Sato Isami.	8	75.3	70.1	82.0	71.5	79.0	60.0	80.0	100
Ito Kadzutaka.	9	72.1	68.0	66.0	75.9	76.0	56.9	86.5	100
Ideta Seitaro.	10	68.3	64.6	72.5	67.7	65.5	69.0	80.5	100
Yanagimoto Michiyoshi.	11	66.4	59.6	61.5	63.6	67.0	72.2	89.0	100
Tanouchi Steroku.	12	64.7	68.0	52.8	78.6	66.0	65.5	76.5	100
Nakashima Shinshi.	13	58.9	54.8	66.0	57.3	53.5	77.8	66.5	100

JUNIOR CLASS.

Name.	Rank.	General Average.	English Literature Weight. 6	Agriculture Weight. 3½	Mechanics Whight. 6	Drawing Weight. 2	Elocution Weight. 1	Composition Weight. 1	Military. Weight. 2	Department.
Uchimura Kanzo.	1	90	95.5	89.8	90	89.9	88.9	95	73	100
Takagi Tamataro.	2	82.3	87.1	85.4	82	85.5	70.0	80	68.5	100
Miyabe Kingo.	3	82.2	79.3	87.6	79.5	89.3	90.5	80	80.5	100
Adachi Mototaro.	4	80.8	80.0	86.5	79.5	86.4	75.0	84	75.0	100
Hiroi Isami.	5	80.1	83.6	73.4	85.0	89.8	61.2	74	69	100
Fujita Kusaburo.	6	78.1	72.4	78.6	89.5	80.1	66.2	62	73.0	100
Ota Inazo.	7	77.3	93.6	76.4	61.0	77.0	80.0	96	68.5	100
Ikeda Takajiro.	8	76.7	81.8	79.9	71.5	87.9	67.5	64	72.0	100
Iwasaki Yukichika.	9	72.7	75.9	83.8	60.0	83.8	69.2	88	67.0	100
Machimura Kinya.	10	59.9	56.5	72.3	44.5	82.5	73.0	68	63.5	100
Tsurusaki Kumeichi.	11	57.8	44.5	71.1	53.0	74.8	63.0	56	72.0	100
Suwa Shikazo.	12	51.7	44.8	66.8	39.5	70.9	61.2	55	58.0	100

SOPHOMORE CLASS.

Name.	Rank.	General. Average.	Botany Weight. 4	Chemistry & Spectrum Analysis Weight. 4	Agriculture Weight. 1½	Trigonometry and Surveying. Weight. 6	Drawing Weight. 2	Military. Weight. 2	Department.
Togano Shiokichi.	1	84.5	81.4	88.7	77	86.5	87.2	80	100
Saito Shozaburo.	2	83.3	77.3	86.2	85.9	88.5	76.5	79.5	100
Otsu Watari.	3	83.0	74.1	88.9	85.8	92.5	81.8	69.5	100
Takaoka Naokichi.	4	82.8	71.1	75.6	84.9	96.0	85.5	77.0	100
Kajima Kisaku.	5	81.1	84.2	87.8	86.4	83.0	70.8	62.0	100
Harada Shigesada.	6	81.0	78.5	81.5	84.5	84.0	86.2	68.0	100
Sugiyama Kiyotoshi.	7	80.2	74.6	80.1	79.5	87.5	82.1	69.0	100
Hisashima Shigeyoshi.	8	77.4	68.8	69.8	74.8	86.0	85.2	88.0	100
Akakabe Jiro.	9	75.0	67.6	75.7	82.2	75.0	89.8	66.5	100
Nakane Toru.	10	69.8	71.9	62.9	77.8	70.0	76.0	62.0	100
Ibuki Sozo.	11	69.0	70.1	66.4	74.7	68.0	64.0	75.5	100
Oidzumi Riotaro.	12	69.0	67.0	60.6	75.5	67.5	81.2	77.0	100
Muto Isaburo.	13	68.0	63.8	56.7	71.6	75.5	81.2	60.0	100
Dzusho Tsunenori.	14	67.0	68.0	52.8	72.2	75.5	71.5	63.0	100
Hori Soichi.	15	64.7	69.1	54.8	72.5	61.5	77.5	67.0	100

FIRST TERM, 1880-81.

SENIOR CLASS.

Name.	Rank.	General Average.	Physics Weight. 6	Microscopy Weight. 8	Geology Weight. 8	History. Weight. 6	Book Keeping Weight. 4	Mili'ary Drill Weight. 2	Deport-ment.
Uchimura Kanzo.	1	93.3	93.7	90.5	95	94.5	94.7	83.5	100
Miyabe Kingo.	2	89.3	90.6	81.5	89	75.5	88.5	89.8	100
Adachi Mototaro.	3	88.7	90.3	87.5	85	84	93	97.5	100
Ikeda Takajiro.	4	88.3	90	83	85	88.5	95	83.5	100
Takagi Tamataro.	5	86.4	87.6	87.5	90	85	95.5	88.5	100
Hiroi Isami.	6	80.3	83.2	75	89	75	90	72	100
Ota Inazo.	7	77.9	61.1	87.5	81	86	88.5	72	100
Fujita Kusaburo.	8	75.8	85.9	65.5	84.7	57.5	91.5	83.5	100
Machimura Kinya.	9	63.5	57.9	50.5	69	60	91	63	100
Tsurusaki Kumeichi.	10	63.2	68.3	51.5	79	49	83	63	100
Suwa Shikazo.	11	52.6	44.1	51.5	65	39	83	63	100
Iwasaki Yukichika.			67		84		88	70.3	100

JUNIOR CLASS.

Name.	Rank.	General Average.	Topography Weight. 8	Astronomy Weight. 8	Zoology Weight. 6	English Weight. 4	English. Composition.	Military Drill Weight. 2.	Department.
Togano Shiokichi.	1	87.8	85.8	99.1	93	70.5	92	85	100
Saito Shozaburo.	2	85.5	86.3	84.6	89	86.5	90	70	100
Kojima Kisaku.	3	84.5	85.5	18	91.5	86	87	62	100
Harada Shigesada.	4	82.4	86.4	90.9	84	78	91	78	100
Takaoka Naokichi.	5	81.3	84.2	96.4	91	53	89	59.8	100
Hisashima Shigeyoshi.	6	80.3	85.3	87.9	86	68	75	65	100
Akakabe Jiro.	7	78.6	77.8	88.7	86	61	90	64.3	100
Otsu Watari.	8	77.1	79.1	97.1	86	57	81	77.5	100
Sugiyama Kiyotoshi.	9	76.7	83.1	81.5	60	51	89	78.3	100
Muto Isaburo.	10	73	73.5	66.2	83	68.5	70	65	100
Hori Soichi.	11	70.6	72.6	66	83	52	71	62	100
Nakane Toru.	12	69.9	73.4	74.7	73	56.5	77	59.8	100
Oidzumi Riotaro.	13	68.9	66.3	73.7	78.5	50	69	69.5	100
Ibuki Sojo.	14	67.6	63.8	72	75	51	68	77	100
Dzusho Tsunenori.	15	60.9	60.5	63	69.5	39.5	70	59.8	100

FRESHMAN CLASS.

Name.	Rank.	General Average.	Algebra Weight. 6	Chemistry Weight. 6	English Weight. 6	Military Drill Weight. 2	Deportment.
Hosokawa Bungoro.	1	90	92.7	97.2	86	70.3	100
Nakagawa Taro.	2	84.6	94.1	87	78	68.5	100
Fukuhara Tetsunosuke.	3	84.2	86.7	94.5	77.6	65.5	100
Watase Shozaburo.	4	80.5	86.5	79.6	79	68.8	100
Kikuchi Kumataro.	5	80.4	94.6	92.5	59	65.8	100
Kawamura Kinyen.	6	78.5	79.6	88	73	63	100
Kashiramoto Motosada.	7	75.8	73.8	70.2	84.6	72	100
Takenobu Yoshitaro.	8	74.5	83.2	76.2	69	60	100
Sase Tatsusaburo.	9	73.2	76.4	78	66.6	69	100
Nakane Hisashi.	10	71.1	77.9	72	66.4	62	100
Teshima Jiuro.	11	70.7	82.9	74.8	58	60	100
Hondo Genjiro.	12	70.2	73.4	74.9	64.6	63.3	100
Yuki Shogo.	13	66.1	69.5	62.8	66	65.8	100
Oka Bunji.	14	63.3	64	58.3	66.2	67	100
Mimashi Kumekichi.	15	63	67.8	58.7	61.8	65	100
Shiga Shigetaka.	16	62.2	58.6	62.2	66.4	60	100
Kuromiya Takeo	17	62	55.8	62.1	66.8	67	100
Hayakawa Tetsuya.	18	59.6	48.6	59.1	70.8	60	100
Yamashita Keitar.	19	54.6	59	51.4	50.4	67	100
Mohri Tsurujiro.	20	53.9	52.8	52	54.2	62	100

AWARD OF KAITAKUSHI PRIZES.

FOR THE YEAR ENDING JULY 6TH. 1881.

The prizes established for the formal "recognition and encouragement of excellence and improvement in all departments" of the College, were awarded as follows:—

First prizes in the Academic Department are five *yen* second prizes two and one-half *yen*.

SENIOR CLASS.

Agriculture;	First, Arakawa Shigehide.
	Second, Sato Shosuke.
Veterinary and Geology; ..	First, Arakawa Shigehide.
	Second, Sato Shosuke.
Physics and Engineering;.	First, Kuroiwa Yomonoshin.
	Second, Ono Kanemoto.
History, English and Mental and Political Science;...	First, Sato Shosuke.
	Second, Watase Torajiro.
Military;	First, Watase Torajiro.
	Second, Kuroiwa Yomonoshin.

JUNIOR CLASS.

Agriculture and Horticulture;	First, Uchimura Kanzo.
	Second, Miyabe Kingo.
English;	Uchimura Kanzo.
	Second, Ota Inazo.

Mathematics and Drawing;	First, Uchimura Kanzo. Second, Miyabe Kingo.
Natural History;	First, Uchimura Kanzo. Second, Miyabe Kingo.
Military;	First, Miyabe Kingo. Second, Adachi Mototaro.

SOPHOMORE CLASS.

Agriculture;	First, Takaoka Naokichi. Second, Kojima Kisaku.
Natural History;	First, Togano Shiokichi. Second, Kojima Kisaku.
Chemistry;	First, Saito Shozaburo. Second, Harada Shigesada.
Mathematics and Drawing;	First. Takaoka Naokichi. Second, Otsu Watari.
English;	First, Kojima Kisaku. Second, Akakabe Jiro.
Military;	First, Hisashima Shigeyoshi. Second, Ibuki Sozo.

PREPARATORY DEPARTMENT.

First prizes in this Department are *yen* one and half; Second prizes, *yen* one.

FIRST CLASS.

History;	First, Sase Tatsusaburo.
	Second, Nakane Hisashi.
Mathematics;	First, Nakane Hisashi.
	Second, Yuki Shogo.
English;	First, Nakane Hisashi.
	Second, Yuki Shogo.
Japanese and Chinese; ...	First, Sase Tatsusaburo.
	Second, Nakane Hisashi.

SECOND CLASS.

English;	First, Okubo Tsurujiro.
	Second, Ono Saburo.
Writing and Spelling; ...	First, Okubo Tsurujiro.
	Second, Ono Saburo.
Geography;	First, Ono Saburo.
	Second, Utsumi Kadzusada.
Japanese and Chinese; ...	First, Okubo Tsurujiro.
	Second, Ono Saburo.

THIRD CLASS.

Engrish, ...	First, Ito Tomoji.
	Second, Date Moto.
Writing and Spelling; ...	First, Ito Tomoji.
	Second, Date Moto.
Arithmetic;	First, Ito Tomoji.
	Second, Date Naoatsu.

Japanese and Chinese; ... First, Yanagiuchi Yoshinoshin.

Second, Hosokawa Takeji.

But for the provision limiting to five *yen* the amount awarded to any one student, Mr. Nakane would have received the first prize in history, and Mr. Okubo the first in geography.

S

1880. Months.	
January.	
February.	
March.	
April.	
May.	
June.	
July.	
August.	
September.	
October.	
November.	
December.	
Whole Year	

1880. Months.	
January.	
February.	
March.	
April.	
May.	
June.	
July.	
August.	
September.	
October.	
November.	
December.	
Whole Year	
No of Observatio Calms, 238.	
Mean Velocity per H	

MYOPIA.

BY

J. C. CUTTER, B. S., M. D.

MYOPIA.

Myopia is the visual state of those who can only see objects very near, and, not only is there a defect of vision, but in a large proportion of the cases there is also a loss of visual acuity. This diseased condition is frequently congenital and often hereditary. It may show a tendency to increase in each successive generation but this depends largely an individual circumstances. Its most frequent cause is an abnormal increase in the length of the eye-ball in its antero-posterior axis. This extension, owing to weakness of the tunics, chiefly occurs at the posterior portion of the globe, and, varying in each case, gives rise to various degrees of near-sight. This tendency to posterior bulging is also increased by the continued tension produced by muscular effort in the accommodation for near objects. This form of myopia is most frequent among the higher and literary classes, who employ their eyes much in reading and writing and upon small objects. Myopia is caused in certain cases by atrophy of the choroid coat; in others it may be the result of long continued working at near objects. In this latter case it is usually slight in degree.

So far as investigations have been made it appears that myopia scarcely prevails at all among uncultivated peoples. Dr. Macnamara of the Indian Service reports that he never met a case of short-sightedness among the Bengalese, and that the disease scarcely exists among the lower classes of India. Travellers speak of the general acuteness of vision among the Eskimo and the long-sight and distinct vision of the North American Indians. Among several hundred colored school-children born of African slave parents in the United States only 3% were found to be myopic. (Dr. Callan) But little myopia has been found among the children of the poor, ignorant Irish

emigrants to America. It does not follow, however, that myopia increases in proportion to the intelligence and education of a people, for the English have very little of it, and the Russians, who have not been characterised by wide spread cultivation or scholarship, have as high as 13.6% in the preparatory classes of its city schools. (Cohn.)

ACTIVE CAUSES OF MYOPIA.

The germs of Myopia are frequently implanted in childhood through premature over-exertion of the eyes at near objects, or through some affection of the refractive media (haziness of the cornea, white spots following ulcers, cloudiness of crystalline lens. etc.) The degree of myopia is often greatly increased during childhood and youth by long continued study, by insufficiency of illumination, by an improper placing of the objects gazed at, by the use of books printed in small and execrable letters or characters as well as a feeble and extensible character of the ocular tunics coexisting in persons affected with a condition of general debility, by spasm of the ciliary muscle giving rise to marked symptoms of asthenopia and by the want of proper ocular and general hygiene. In the schools of Detroit, U. S. A., among the pupils of seven to eight years of age who had attended school only one or two years, there was no myopia; in the highest grade of ten High Schools, there was 12% (Dr. Lundy.) In the public schools of New York city (having a large percent of children born of German parents) the myopia ranged from 3.5% in the youngest classes to 26.78% in the oldest, and in the College of the City of New York as high as 35%. (Drs. Loring and Derby.); in St. Petersburg from 13.6% in the preparatory classes to 41.3% in the highest (Cohn); in Lucerne, Switzerland, from none in the lowest classes

to 61.5% in the advanced classes (Dr. Girand-Teulon); in Breslau, from 0.4% in the lowest class to 63.3% among those in the highest classes (Dr. Cohn.) The Germans and Swiss-Germans have the greatest mental application and the worst print and script of all European nations. In this respect the Russians are much better. On the other hand, the English and Americans have better and clearer printed school books and take more out-of-door exercise. This rapid development of myopia among the German school children shows that they are subjected to very exerting causes; such as execrable print, much writing and copying, a forcing-house system of education for the bureaucracy examinations, defective illumination of the school houses and all working with a strong hereditary tendency to this malady. Many or all of these causes apper to be in action in many of the country-schools of Japan.

EXTENSION OF THE MYOPIC PROCESS.

When myopia is once established, and unless its tendency is speedily counteracted, it provides for its own increase by the required compensatory effort. This malady usually attains a considerable degree before its very existence is discovered, since its oncome and progress is usually slow and gradual and thus the unfortunate is not aware of his diseased condition; neither do his friends detect it. In some cases the progress of the myopia is marked and rapid, in others slow and insidious. It is generally somewhat progressive, especially between the ages of 15 and 25 years. It is often markedly so in hereditary myopia and in myopic-persons who use their eyes in reading, writing and copying under poor illumination, and especially under deficient artificial illumination. Every myopic eye is a weak organ. It is

liable to many dangers and mischances. It is an organ which is capable of being preserved in a state of usefulness under certain conditions. The causes which give rise to myopia are still more favorable to its future development. The anatomical cause most frequently depends on a morbid posterior extension of the tunics—sclerotic and choroid. If this extension has attained a certain degree, the tunics become attenuated, the resistance is thereby diminished and the extension cannot remain stationary, because in "accommodation"* in the myopic eye the pressure upon the contained fluids is increased and the attenuated weakened parts must recede. Childhood and youth is the critical period for the myopic eye. If the myopia has not increased too much, after a time this posterior bulging may remain stationary: if it developes to an high degree, it is difficult to set a limit to the extension process. If it continues progressive, the eye becomes less available, and *incurable* disease may be established in the vitreous humor and the tunics of the eye. The increase of near-sightedness at this period is usually accompanied by symptoms of eye-irritation— redness, heat, gritty sensations and increased lachrymation. Hence at this period of life, and especially in persons of feeble constitution, all promoting causes, like overworking the eyes in a stooping or lying posture, unnecessary strong convergence of the eyes on minute insufficiently illumined objects, etc., must be especially avoided.

PREVENTION.

The lesser grades of myopia constantly pass undetected

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* *"Accommodation" is the voluntary act by which rays of light from objects at different distances are brought to a focus on the retina. The highest authorities teach that this is accomplished by the action of the ciliary muscle within the eye.*

under common observation. The eyes in which myopia does exist and might easily be detected are *supposed* by the friends to be normal and are so considered by the child, not having enjoyed within its memory better vision. At a late date the deficiency attracts attention and the eyes are found to be irremediably altered. Before treating a malady it is absolutely essential to ascertain if a diseased action is present, its nature and its tendency. An accurate diagnosis having been made, these considerations of treatment are appropriate. Hence the great importance of having all school-children examined at proper intervals by educated medical men for the purpose of detecting at an early period ocular and general systemic defects.

The majority of the near-sighted are to be found in the dwellers in towns and cities and among the more educated classes. This, in part, depends on the childhood occupations of this class, the early attention paid to reading, writing and the study of small objects, combined with a less active, more in-doors life, a poorer hygiene, a lessened bodily development and the consequent possession of weakened and more distensible eye tunics; and partly to an hereditary and racial influence. All of these factors combined tend to the deviation of the eyes of such children from the normal form. Therefore the tendency, prompted by vanity, among the educated classes to teach children to read, to write and to distinguish minute differences in objects and to fix their attention on eye-taxing duties for comparatively long intervals at too early an age must be strongly condemned. The premature acquisition of these mechanical powers prove of no real future advantage. They are almost inevitably obtained at the cost of some imperfection in one or more organs or of the entire organism. Hence for the prevention of myopia a proper attention should be paid to the physical well-being, to the

posture, especially of the head, during study, to the size, form and clearness of the printed characters of their books, to the position of the object studied, to the illumination and most important of all to frequent intervals of cessation from eye-work during the period of childhood and early youth. The younger the school-children, the shorter should be the daily session and the more frequent the changes in the eye-employment.

DETECTION.

The detection of myopia is generally a matter of no difficulty— distant objects cannot be clearly distinguished. A suitable concave lens enables the myope to distinctly perceive such distant objects. It is true that myopia may be confounded with amblyopia, or weak-sight, and even with certain cases of presbyopia, or far-sight, but these departures from the normal are not benefited by concaves. At other times amblyopia coexisting with myopia in the same eyes may complicate the diagnosis. In determining the degree of myopia, at first the eyes of each individual may be examined together, but later each should be tested separately, for there is frequently marked differences between the left and the right eyes. In testing the eyes to determine the acuteness of vision and the position of the near and far-point, it is preferable that Snellen's test-types, or characters constructed on the same principles should be used, thus securing uniformity in the tables. The letters employed by Snellen are square—like capitals H K R U etc— and their size increases at a definite ratio, so that each number is seen at its appropriate distance by a normal eye at an angle of five minutes. Each of these characters have limbs and subdivisions equal in breadth to one-fifth of the height of the character. As a rule these characters cannot be seen distinctly beyond

those distances at which they are used as tests. The acuteness of vision is then expressed by the distance of the test-types from the eye divided by the number of the smallest type which can be recognized with certainty at that distance.

TREATMENT.

The belief that short-sighted persons need not use spectacles for reading or other near work, if they can see to accomplish it without them, is erroneous. If myopia is established, then its progressive increase must be met by the removal of the active cause. This cause is the strain thrown upon the tunics of the eye by the undue and prolonged convergence effort in the attempt at focusing the entering rays upon the appropriate part of the retina. This voluntary convergence effort must be prevented. The prevention can be accomplished only by the use of appropriate lens. The object of spectacles is not to make the patient see any better but to compel him to keep his work farther away, thus doing away with the convergence effort. The lens should be selected with accuracy and care. The individual peculiarities of each eye should be considered. If the lens are not suitable, more especially if they are too strong, they will prove most injurious to the eyes. As a rule the *weakest* lens with which the person can see distinctly at a distance should be given. Spectacle frames are preferable to the pince-nez or those held in place by cords or muscular-contractions.

The use of spectacles in myopia should be commenced early in life, for at this time the tunics of the eye are comparatively lax and yielding and at this period the requirements of education— reading, writing, drawing— demand a closer application than at other epochs of life. By their early use, not only may a commencing myopia

be checked, but the use of glasses later in life avoided. The use of glasses affords the myope a more extended visual horizon, opens up to him a means of uncouscious education in that he sees more and more distinctly, and enables him to preserve his waning eyesight. Myopes, even when fitted with glasses, should not use books printed in very small or in blurred type and should not attempt to read under defective illumination whether natural or artificial.

Results of Tests at the Sapporo Agricultural College 1880

Class of	1880	1881	1882	1884	Totals.
Average age at time of test.	21.7	20.2	19.8	17.6	
* Emmetropia of both eyes.	7	6	3	12	28
,, of right eye	4	3	3	10	
,, of left eye	6	6	3	12	
Myopia	6	7	12	8	33
Myopia with Amblyopia.	3	3	2	2	
Total number examined.	13	13	15	20	61

The times at which the Myopia became marked causing inconvenience and eye-weariness.

Class of	1880	1881	1882	1884	Total.
Months resident at College	45	33	20	1	
Under one year.	3	3	3		9
,, two years.	2		1	2	5
,, three years.	1	1	3	4	9
,, five years.		2	3	1	6
Upwards of five years.	1	1	2		4

* *Emmetropia is the normal condition of the eye as regards its visual range.*

Range of Vision remaining.

Class of	1880	1881	1882	1884	Total.
Normal vision or $\frac{5}{5}$	7	6	3	12	28
Ranging from $\frac{5}{5}$ to $\frac{4}{5}$	1				1
,, ,, $\frac{4}{5}$ to $\frac{3}{5}$	1		1	1	3
,, ,, $\frac{3}{5}$ to $\frac{2}{5}$	1	2	2	2	7
,, ,, $\frac{2}{5}$ to $\frac{1}{5}$	3	2	3	1	9
,, ,, $\frac{1}{5}$ to 0	1	2	6	4	13

The tables here given, compiled from notes of the test examinations conducted during the summer of 1880 upon the students of the Agricultural College at Sapporo and arranged according to classes, show that 54% of the students are myopic; that in 16.5% amblyopia coexists with myopia; that 29.5% of the students were myopic on entrance to the college; that 23% of the students, or 39% of the myopes, have developed visual incapacities during their college course; and that 39% are in the division of those retaining less than one-fifth of the normal range. The myopia ranged from that requiring a concave 40 up to concave 7 to enable the student to see clearly and distinctly at the normal distance for the test types employed. The amblyopia, with two exceptions, was found coexisting with temporary ill-health or with nervous exhaustion. Of the congenital, hereditary affection known as "Daltonism" or colorblindness, no case was found among the students tested.

Thus it appears that while in the highest grade of the city schools of Detroit, U. S. A. there is 12% of myopia; in Cincinati, 16%; in New-York city, 26.8%; in the Brooklyn Polytechnic 35 to 40%. (This last appears to be due to racial influences. The number of students in this school born of German emigrants is very large. In the same classes it was found that the ratio of myopia was in the

German 24%, American 19% and Irish 14%); Russian city schools 41.8%; in Lucerne 61.5% and in Breslau 63.8%, yet among the students of a college placed in the open country, in a college requiring a certain amount of manual labar and military exercise there is found 54% of myopia and that 23% of the students entering the college become conscious of visual incapacities during an average connection with the same of two years and nine months.

Thus are no statistics at hand to compare the showing of this college with that of the other foreign-language schools in the Empire, but it is to be hoped that their myopic average is very much lower. It has been ascertained that myopia in the schools of Germany and Switzerland increases with great rapidity in ascending from the lower to the higher grades and in a far higher ratio than in schools of the same grades in Russia, England and America. The reasons to account for this are held to be: racial tendency, great application, the worst print and script employed in European schools, an excessive amount of writing and copying occassioned by the pedagagic dictum "that by writing we learn," and, in too many of the school and study rooms, defective illumination. Leaving out the question of racial tendency, which has not yet been proven in Japan, daily experience demonstrates that similar factors are at work in the production of myopia among the educated classes of Japan as are held to be its active, efficient causes in Germany,

MITIGATION.

The myopic tendency appears to be progressive in this college. In the majority of the cases the tendency to the malady was implanted before the students' entrance. The demands of student life in a country of long winters, of

great moisture and of extensive and long continuing banks of sun-obscuring clouds, tend to increase ocular maladies rapidly. Also the daily duties of these students— recitations, field-work, military evolutions— are such that most of the studying and writing is of necessity performed under artificial conditions of confinement, of non-hygienic positions, of vitiated and heated air and, too frequently, under inadequate illumination. Are there measures which can be adopted to prevent the onset,— granting that there may a racial or an hereditary tandency—to stay the progress and to mitigate the inconveniences and perils incident to progressive myopia?

(1) It is the duty of every *student* to exercise that reasonable care, thought and prudence which in the matter of eye-sight every-one is bound to take. The myope should not select his spectacles at hap-hazard, but should secure such a pair as will enable him to see his work clearly and distinctly thus preventing the necessity of bending forward the head, which latter movement gives rise to an increased flow of blood to the eyes, to an increased tension of the fluids within the globe and thus to an increase of the posterior bulging of the tunics. He should commence the use of spectacles immediately on the discovery of near-sightedness and should use them persistently. He should be especially careful about the quantity, quality, directoin and general management of the artificial illumination. He should personally attend to his study-lamp and should keep the chimnies and shade clean and the burner in its best working condition. He should so divide up his work as to bring that which is most trying to the eyes in the hours of sun-light, should not read or draw by evening twilight, should not read in bed by artificial light and should not disregard the most trifling monitions of eye-fatigue. By seasonable and persistent attention to visual hygiene, by the building up

of a general good health, by increasing the general vigor of the muscular system and by a proper attention to his surroundings, he can hope to retain his failing eye-sight in such a condition as to afford him fair service through a long life. The same principles are applicable to the scholars, students and young officials of Hokkaido, who also are daily exposed to influence tending towards the production of ocular diseases.

(2) The *officers* of *instruction* may aid in staying the progress of ocular maladies, and myopia in particular, by selecting such books as are well-printed upon fair paper with large, clear and distinct characters; by diminishing the amount of copying to be done by artificial light; by encouraging the pupils to consecutive daily exercises in the open air; by requiring the myopes to maintain a posture in which the head is not allowed to fall too far forward and by attention to the illumination of the recitation rooms especially in the later hours of a winter's afternoon.

(3) Natural light is congenial and necessary. Under defective illumination all eyes are prone to suffer in acuteness of vision, in the power of sustained effort and, in young people, in visual distance. Hence proper care as to the quantity, quality and direction of the illuminating rays is of importance. The defects in solar illumination of a room, as dazzling, limited or variable amounts, presence of shadows etc, are often trying to the diseased eye. These defects are enhanced and more marked under artificial methods of ligting. The artificial light, in ordinary use, unlike the solar, is always more or less reddish or orange in hue, and, in relation to its illuminating properties, is warmer the greater the proportion of the red rays which it contains. These peculiarities of artificial light are productive of important consequences. When there is an excess of red rays, not only are colors rendered dif-

ficult of recognition but the light itself affords less illuminating power, thus necessitating the combustion of more material with a corresponding increased evolution of heat in order to make up for the primary obscuration of the red rays. This secondary excess of heat and red rays rendered necessary by the inferior quality of the light affects the eye injuriously and renders it more irritable, more painful and more troublesome. The extra heat acts especially on the surface of the globe and of the inner surface of the lids, drying and irritating them and predisposing to inflammatory affections. Also the poorer the quality of the artificial illumination, the nearer must the student approach his work to the eye and his eye to the flame and the more evident will become the deleterious heating, drying and coloring properties of the flame upon his visual apparatus. Another frequent disadvantage of the artificial light is its unsteadiness and its variability. The former has been much improved of late by the employment of means to preserve a uniform proportion between the air supply and the combustible and the latter by modified chimnies to prevent flickering.

The *college authorities* can do much to alleviate the condition of the myopes, as well as that of the emmetropes, by the selection of window glass with parallel plane surfaces, by the employment of the least amount of shadow-forming sash-bars consistent with strength and economy and by requiring that all the windows shall be kept scrupulously clean. They should endeavor to supply lamps in which such perfect combustion is secured by the accurate adaptation of the quantity of the combustible to the quantity of the atmospheric air which gains access to the flame, that there will be an entire absence of dark, smoky, much colored flame. Each lamp should be provided with movable white or green and white porcelain shades. These means should be supplimented by meas-

ures to enforce the keeping of the lamp and its appurtenances clean and in their best working condition; to provide each room with sufficient outlets for the products of lamp combustion and the evolved heat, as well as inlets for the entrance of an abundance of air free from dust, sharp particles, smoke and acrid vapors; and to remove all obstacles to the building up, invigorating and fixing of a condition of healthy young-man-hood.

(4) In the choice of a life occupation of a young man the capabilities of the eyes should never be neglected. Eyes, which within a few years would fail a copyist, a draughts-man or an engraver, would last their possessor a life-time, if he was employed as an agriculturist or a general superintendant. He who has sound and normal eyes may be assigned to any occupation without reference to his ocular apparatus. He who is myopic or amblyopic or has eyes which are inclined to inflammatory troubles, should not be assigned to duties which require continued watchful eye-service. The attention of the *officers* of this *department* is requested to the facts that myopes with high degrees of near sightedness are not adapted to duties which require that the vision be directed by turns to near and to far objects, as in railway or marine service; that a myope who is ocularly helpless in the absence of his spectacles is not suited to positions which develop sudden emergencies, as police or exploration work and that a myope in whom the malady is progressive should be excused from continued office work. Amblyopes should not be employed in occupations which demand continuous application of the eyes upon minute work or small objects. Persons who frequently suffer from various forms of ocular inflammation should not be permitted to undertake forms of employment in which they will be exposed to dust, to smoke and to external irritants. In general, all young persons with feeble systems and coexistent weak